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6.0 ECONOMIC EVALUATION

This section assesses the economic impacts of the alternatives presented in this document. Additional economic and social considerations and information are discussed in Chapters 3, 4, 7, 8, and 9 of this document.

6.1 Number of Vessel and Dealer Permit Holders

In order to examine the baseline universe of entities potentially affected by the preferred alternatives, NMFS analyzed the number of permits that were issued as of May 2007 in conjunction with HMS fishing activities.

As of October 1, 2007, there were a total of 527 commercial permit holders in the Atlantic shark fishery (231 directed and 296 incidental permits). Table 6.1 provides a summary of these permit holders by region. Further detail regarding commercial permit holders is provided in Chapter 3 and the Consolidated HMS FMP.

Table 6.1 **Distribution of Shark Limited Access Permits (by address of permit) holder between 2001 and 2007.** Data for 2001-2005 are as of October 1 for each year. (NAT: North Atlantic, SAT: South Atlantic, FL: Florida, GOM: Gulf of Mexico)

Region/State	# Directed Shark	# Incidental Shark
NAT	49	67
SAT	29	28
FL	132	137
GOM	13	50
Other	1	
No Vessel ID	7	14
2007	231	296
2006	240	312
2005	235	320
2004	241	348
2003	251	359
2002	251	376

* Number of permit holders in each category, and state, is subject to change as permits are renewed or expire.

As of October 1, 2007, there were a total of 269 Atlantic shark dealer permit holders. Table 6.2 provides a summary of shark dealer permit holders by region. Further detail regarding shark dealer permits holders is provided in the Final Consolidated HMS FMP. All dealer permit holders are required to submit reports detailing the nature of their business. For shark permit

holders, dealers must submit bi-weekly dealer reports on all HMS they purchase. To facilitate quota monitoring "negative reports" for shark are also required from dealers when no purchases are made (*i.e.*, NMFS can determine who has not purchased fish versus who has neglected to report).

Table 6.2 Number of shark dealer permits issued in each state as of October 2002-2007. The actual number of permits per region may change as permit holders move or sell their businesses.

Region/State/Country	Atlantic shark dealers
NAT	58
SAT	45
FL	102
GOM	34
Other	30
Totals 2007	269
2006	336
2005	228
2004	230
2003	254
2002	267

6.2 Gross Revenue of the Commercial Shark Fishermen

NMFS calculated gross revenues by combining current Federal permit holders with their reported landings from logbooks and shark dealer reports averaged from 2003 to 2005. These landings were multiplied by 2006 ex-vessel prices (by region) for LCS flesh, LCS fins, and SCS flesh obtained from dealer reporting.

Table 6.3 **Estimates of the total ex-vessel annual revenues of Atlantic Shark HMS fisheries.** Sources: NMFS, 1997; NMFS 2004, 2005; Cortés, 2003; Cortés and Neer, 2002, 2005; Cortés, pers.comm.

Species		2000	2001	2002	2003	2004	2005	2006
Non-Sandbar Large coastal sharks*	Ex-vessel $/lb dw	$0.68	$0.91	$0.99	$0.78	$0.86	$0.48	$1.02
	Weight lb dw	3,762,000	3,562,546	4,097,363	4,421,249	3,206,377	2,024,106	2,235,324
	Fishery Revenue	$2,560,307	$3,256,955	$4,040,977	$3,437,521	$2,757,484	$971,571	$2,280,030
Pelagic sharks	Ex-vessel $/lb dw	$1.09	$1.11	$0.99	$1.04	$1.12	$1.03	$1.14
	Weight lb dw	215,005	362,925	303,666	616,967	450,833	270,021	186,901
	Fishery Revenue	$233,650	$401,430	$299,487	$643,188	$504,933	$278,122	$213,067
Small coastal sharks	Ex-vessel $/lb dw	$0.46	$0.79	$0.52	$0.43	$0.50	$0.59	$0.49
	Weight lb dw	672245*	719,484	579,441	549,799	677,305	650,202	822,093
	Fishery Revenue	$309,926	$568,441	$299,023	$236,414	$338,653	$383,619	$402,826
Sandbar sharks*	Ex-vessel $/lb dw	-	-	-	-	-	$0.47	$0.56
	Weight lb dw	-	-	-	-	-	1,282,477	1,516,497
	Fishery Revenue	-	-	-	-	-	$602,764	$849,238
Shark fins (weight = 5% of all sharks landed)	Ex-vessel $/lb dw	$10.47	$19.67	$19.87	$17.09	$16.25	$17.94	$18.43
	Weight lb dw	232,462	232,248	249,024	279,401	216,726	211,340	238,041
	Fishery Revenue	$2,434,344	$4,568,937	$4,949,056	$4,774,959	$3,521,793	$3,791,440	$4,387,096
Total sharks	**Fishery Revenue**	**$5,538,227**	**$8,795,763**	**$9,588,545**	**$9,092,082**	**$7,112,863**	**$6,027,516**	**$8,132,257**

Note: Average ex-vessel prices may have some weighting errors. Landing estimates include prohibited as well as unclassified landings for each complex.
*Sandbar sharks are broken out of the large coastal shark complex for 2005 and 2006 to provide baseline information for this proposed Amendment. This exaggerates the discrepancy in revenue for LCS in 2005 and 2006 when compared across years

Of all Atlantic HMS, sharks bring in the lowest total gross revenues (~$8.1 million total in 2006). If gross revenues for directed permit holders is averaged across the approximately 143 active directed shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $33,000.

Table 6.4 provides data on the prices shark fishermen received at the dock. The average values for ex-vessel prices from the Southeast Science Center's Accumulative Landings System (ALS) and dealer reports from the Northeast were used to construct the table. Table 6.4 reports ex-vessel prices by region, shark complex, and year.

The ex-vessel price data indicates somewhat stable ex-vessel prices since 2003. The ex-vessel prices for sandbar shark have been broken out from the large coastal shark complex in order to analyze the proposed new sandbar and LCS other quota categories. However, in 2006 sandbar ex-vessel prices declined somewhat in both the South Atlantic and Gulf of Mexico regions. The non-sandbar LCS ex-vessel prices have followed a very similar trend pattern. Pelagic shark prices appear to have been higher in the North Atlantic and Gulf of Mexico versus the South Atlantic from 2003 to 2006. Small coastal shark ex-vessel prices have been steadily trending upward in all regions since 2003. Finally, shark fin ex-vessel prices have been fluctuating in the $14 to $20 range since 2003.

Table 6.4 Ex-vessel price per pound dw by region, shark complex and year. Source: Accumulative Landings System maintained by the Southeast Fisheries Science Center.

Species	Area	1996	1999	2000	2001	2002	2003	2004	2005	2006
Non-sandbar large coastal sharks*	Gulf of Mexico	$0.21	$0.56	$0.43	$0.44	$0.36	$0.38	$0.37	$0.49	$0.47
	S. Atlantic	$1.02	$1.10	$0.78	$1.12	$1.27	$0.39	$0.44	$0.49	$0.46
	Mid-Atlantic	$0.55	$0.59	$0.53	$1.09	$1.56	$1.62	$1.93	$0.36	$2.14
	N. Atlantic	$0.88	$0.77	$1.01	$1.02	$0.77	$0.72	$0.70	$0.24	$1.02
Pelagic sharks (including porbeagle sharks)	Gulf of Mexico	-	$1.36	$1.31	$1.42	$1.11	$1.13	$1.08	$1.09	$1.21
	S. Atlantic	$0.62	$0.83	$0.76	$0.68	$0.67	$0.71	$0.65	$0.70	$0.72
	Mid-Atlantic	$1.21	$1.23	$1.20	$1.09	$1.17	$1.21	$1.29	$1.39	$1.38
	N. Atlantic	$1.31	$0.81	$1.10	$1.23	$1.00	$1.12	$1.46	$1.43	$1.26
Porbeagle Sharks*	Gulf of Mexico	-	-	-	-	-	-	-	-	-
	S. Atlantic	-	-	-	-	-	-	-	-	-
	Mid-Atlantic	-	-	-	-	-	-	-	-	$1.12

Species	Area	1996	1999	2000	2001	2002	2003	2004	2005	2006
	N. Atlantic	-	-	-	-	-	-	-	-	$0.95
Small coastal sharks	Gulf of Mexico	-	$0.55	$0.52	$0.58	$0.48	$0.40	$0.45	$0.55	-
	S. Atlantic	$0.25	$0.50	$0.48	$0.52	$0.53	$0.51	$0.61	$0.61	$0.53
	Mid-Atlantic	$0.25	$0.47	$0.38	$0.55	$0.48	$0.38	$0.44	$0.42	$0.45
	N. Atlantic	-	-	-	$1.51	$0.58	-	-	$0.50	-
Sandbar sharks*	Gulf of Mexico	-	-	-	-	-	$0.39	$0.40	$0.45	$0.40
	S. Atlantic	-	-	-	-	-	$0.45	$0.35	$0.42	$0.38
	Mid-Atlantic	-	-	-	-	-	-	-	$0.64	$0.91
	N. Atlantic	-	-	-	-	-	-	-	$0.54	-
Shark fins	Gulf of Mexico	-	$14.01	$15.99	$20.90	$22.64	$18.12	$17.93	$20.21	$20.65
	S. Atlantic	$10.74	$11.10	$14.16	$18.43	$17.10	$15.85	$14.57	$15.42	$16.20
	Mid-Atlantic	$4.60	$3.41	$4.90	-	-	-	-	-	-
	N. Atlantic	$2.69	$1.19	$6.83	-	-	-	-	-	-

*Sandbar sharks are broken out of the large coastal shark complex for 2005 in the North Atlantic to provide baseline information for this proposed Amendment. This exaggerates the discrepancy in revenue for LCS in 2005 in the North Atlantic when compared across years.

6.3 Variable Costs and Net Revenues of Commercial Shark Fishermen

In 2003, NMFS initiated mandatory cost-earnings reporting for selected vessels to improve the economic data available for all HMS fisheries. In the past, most of the studies regarding PLL variable costs and net revenues available to NMFS analyzed data from 1996 and 1997. The Consolidated HMS FMP provides a summary of several past studies on the variable costs and net revenues of longline fleets.

An analysis of the 2004 HMS logbook cost-earnings data provides updated information regarding the costs and revenue of a cross section of vessels operating in the HMS fisheries. The data contains a total of 579 trips taken by 51 different vessels. As described in Larkin *et al*. (2000), median values are reported. Median gross revenues per trip for 2004 were approximately $12,112. Median total costs per trip were $4,345 (compared to $3,320 in the Larkin *et al*. (2000) study), with fuel costs making up $567 (13 percent) of those costs. Median net revenue in this sample was $6,728 per trip (compared to $8,624 in the Larkin *et al*. (2000) study). The typical trip was nine days long and involved six sets. The median number of crew was three, and the average share paid to crew was 11 percent of net revenue ($740 per trip). The captain share of net

revenue was 20 percent ($1,346) and the owner share was reported to be 50 percent ($3,364). The 2004 cost earnings information is similar to the findings of the 1996 study, but gross revenues appear to be lower than the Porter *et al.* (2001) study of 1997 operations.

6.4 Expected Economic Impacts of the Alternative Suites

In this rulemaking, NMFS considered five alternative suites to address shark management measures that will meet the objectives of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) and the Consolidated HMS FMP. The expected economic impacts of the five alternative suites considered and analyzed are discussed below. An overview of the five alternative suites is presented in Table 2.1.

6.4.1 Alternative Suite 1: Maintaining the Existing Atlantic Commercial and Recreational Shark Fisheries (Status Quo)

Quotas/Species Complexes and Retention limits

The status quo alternative could lead to neutral socioeconomic impacts if the current LCS quota of 1,017 mt dw, in conjunction with the 4,000 lb LCS directed shark permit trip limit, is maintained. Under this alternative the current fishing effort would not likely change, which could lead to economic benefits to fishermen and associated communities in the short term. Of all Atlantic HMS, sharks bring in the lowest total gross revenues (~$8.1 million total in 2006). If gross revenues for directed and incidental permit holders is averaged across the approximately 298 active directed and incidental shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $20,000. However, long term, negative economic impacts could occur if current fishing mortality of sandbar sharks, an economically important species, is not decreased as recommended by the LCS stock assessment, and this species continues to be overfished. This could lead to more restrictive management measures being implemented in the directed and incidental shark fisheries. This is particularly important given the LCS overharvests under the status quo in 2006 in the South Atlantic and Gulf of Mexico regions and in the Gulf of Mexico region during 2007.

Time/Area Closures

The status quo alternative would maintain the existing closures and would not add any new closures. This could have neutral economic impacts, primarily because activities related to fishing and market availability, consistent with the current closures, would remain the same.

Reporting

Currently, Federal shark dealers are required to report on a bimonthly basis and the economic impacts of reporting would not change under the status quo alternative because activities related to the reporting timeframe would remain the same. However, negative economic impacts could occur if shark dealers do not report when required or in

a timely fashion, making it difficult for NMFS to monitor the quota and prevent overfishing of economically important species.

Unclassified or unidentified landings of sharks reported in shark dealers reports are currently counted as LCS by the Agency. This may have neutral or slightly negative economic impacts. While listing sharks as unclassified may save shark dealers time in the short-term by alleviating the need to properly identify individual sharks purchased, inaccurate reporting may lead to inaccurate quota monitoring. Shark dealer reports form the basis of quota monitoring for sharks and if the reports submitted by dealers do not accurately reflect what species of sharks are being landed, seasons may close earlier than necessary, overharvests may occur impacting future seasons, and data used in stock assessments may lead to further restrictions on fishing effort as a result of assessments models that are run with data that is incorrect or does not provide information on specific species landed.

Seasons

Maintaining the trimester seasons under the status quo alternative, which provides fishermen and dealers with more open seasons, would likely have neutral economic impacts. With an annual LCS quota of 1,017 mt dw, spreading the seasons out over the calendar year could potentially result in greater economic stability for fishermen and associated communities. However, if quotas are reduced to comply with the recommendations from the LCS stock assessment, trimester seasons could become less economically stable for fishermen and dealers because of the reduced amount of quota and fishing effort during the calendar year.

Regions

The economic impacts of maintaining three management regions under the status quo alternative would likely be neutral. The three regions would likely continue to enhance equity amongst regional user groups, provided that the North Atlantic region only has sharks present in their waters during certain months. No significant economic impacts are anticipated as this alternative seeks to maintain historical regional catches.

Recreational Measures

Neutral social and economic benefits would occur if the current bag limit for HMS Angling permit holders is maintained at one shark greater than 54 inches per vessel per trip as well as one Atlantic sharpnose and one bonnethead shark (both of which are in the SCS complex) per person per trip. Recreational fishing and charter trips targeting sharks are very important to coastal communities and shark fishing tournaments can generate a substantial amount of money for surrounding communities and local businesses especially in the northeastern United States where shark fishing is most prevalent. In 2007, there were 59 tournaments with prize categories for pelagic sharks and 42 (combined) tournaments for LCS and SCS.

6.4.2 Alternative Suite 2: Shark Fishery for Directed, HMS Angling, and HMS Charter/Headboat Permit Holders Only

Species Complexes

Sandbar sharks

Placing sandbar sharks in their own management category should have neutral economic and social impacts for fishermen. Establishing a separate category for sandbar sharks from the LCS complex is mainly administrative in nature and would affect how the Agency monitors the sandbar shark quota. The establishment of a separate sandbar category would not impact fishermen, as they already record shark interactions to the species level in their logbooks. However, the economic and social impacts of reducing the sandbar quota and retention limits would have significant economic impacts and are discussed in the next section.

Non-sandbar LCS

Establishing a non-sandbar LCS complex should also have neutral economic and social impacts on shark fishermen. The non-sandbar LCS complex is similar to how the LCS complex has been managed in the past. The new complex would be established to help the Agency distinguish between sandbar and non-sandbar LCS landings. In addition, while the Agency has managed sharks on a complex basis, fishermen have recorded shark interactions on a species basis in the logbooks, so there should be no negative impacts to fishermen by the restructuring of the LCS complex. However, the non-sandbar LCS quota reduction could have negative economic and social impacts. These impacts are discussed in the next section in combination with retention limits.

Porbeagle Sharks

Placing porbeagle sharks on the prohibited list for commercial and recreational fishing would result in no commercial or recreational landings of this species. This would have neutral economic and social impacts. This species is not targeted by U.S. fishermen, and is predominately caught, and discarded alive, in the U.S. swordfish and tuna PLL fishery. In addition, most recreational fishermen target mako, blue, and threshers sharks from the pelagic management unit (Table 3.24), therefore catch and release of porbeagle sharks is not expected to have much, if any, negative economic and social impacts on recreational fishermen. However, there are some porbeagle sharks caught in tournaments in the northeast, so prohibiting their retention could have some economic impact on these events. Porbeagle sharks are usually caught in the Northeast Distant area by commercial fishermen and a few recreational catches have been reported from Maine through Virginia (Table 3.26); therefore, fishermen in the North Atlantic would be affected the most by placing porbeagle sharks on the prohibited species list. A more detailed analysis of the economic impacts of establishing a 0 mt dw commercial porbeagle shark quota is discussed in the next section under quota and retention limits.

Quotas and Retention Limits

Alternative suite 2 would only allow sharks to be retained by shark directed permit holders. Therefore, incidental permit holders would be affected by alternative suite 2. Since the majority of incidental shark permit holders are in the states of Florida, Louisiana, New Jersey, and North Carolina as of 2007 (Table 3.32), these states would be most negatively impacted by alternative suite 2. As of 2007, there were 231 shark directed, 296 shark incidental, and 269 shark dealers permit holders. One hundred forty-three vessels with directed shark permits and 155 vessels with shark incidental permits reported landings in the Coastal Fisheries Logbook from 2003 to 2005 and could be considered active. In addition, shark dealers could also be negatively impacted due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

Alternative suite 2 would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota. However, 2 mt dw would be allocated specifically for sandbar sharks, the remaining 41.2 mt dw would be allocated for all species besides sandbars, and dusky sharks would not be allowed to be collected for display. This is expected to have minimal impacts on collectors of sharks for public display and shark researchers. On average, 2 mt dw of sandbar sharks per year have been collected under the exempted research program from 2000 to 2006. Therefore, there would not be an appreciable decrease in sandbar allocation compared to what was collected in past years. Thus, minimal negative economic impacts are anticipated. Ninety-four dusky sharks have been collected under the exempted fishing program from 2000 to 2006 (or 13 dusky sharks per year). Due to the prohibition of dusky shark collection under alternative suite 2 for public display, this could have a negative economic impact on a few collectors, although the majority of dusky shark collections have been for shark research. Collectors and researchers would still have the majority of the shark display and research quota (41.2 mt dw or 57.2 mt ww) available for all non-sandbar LCS beside dusky sharks.

Fishery level impacts

Of all Atlantic HMS, sharks bring in the lowest total gross revenues (in total ~$6.0 million total in 2005; Table 3.43). On average, total sandbar landings of 1,310,449 lb dw and total annual non-sandbar LCS landings of 1,585,671 lb dw were reported from Federal and state shark dealer reports. In 2006 ex-vessel prices, this is equivalent to $4,903,001 (Table 4.9). Under this alternative suite, the commercial quotas would be reduced to 116.6 mt dw for sandbar sharks and 541.2 mt dw for non-sandbar LCS; however, to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico, the non-sandbar LCS retention limit was lowered such that only 86.1 mt dw of sandbar sharks and 253.6 of non-sandbar LCS could be landed under alternative suite 2 (see discussion in Appendix A under "*Non-sandbar quota and retention limits"* and Table 4.2). In 2006 prices, assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight, this is equivalent to $1,333,417 (Table 4.10). This is an overall 73-percent reduction compared to the current gross revenues under alternative suite 1 (Table 4.10).

On average, 1.7 mt dw (3,867 lb dw) of porbeagle sharks were commercially landed between 2003 and 2006. Based on 2006 ex-vessel prices, this is equivalent to $7,378 fishery-wide (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, since porbeagle sharks would be placed on the prohibited list under alternative suite 2, there would an estimated reduction in gross revenues of $7,378 to the fishery by prohibiting porbeagle shark landings.

In alternative suite 2, overharvests of quota for each category would be removed from the next season's quota. This is currently done under the status quo; therefore, it is not anticipated to result in any more negative economic impacts than what fishermen currently experience under the status quo regulations. Underharvests for species that are not overfished or are not experiencing overfishing would have up to 50 percent of the base quota applied to the next season's quota. Currently all of the underharvest for a given complex has been applied to the next year, same trimester's base quota. This has been most significant for small coastal sharks (SCS), which, on average from 2004 through the first season of 2006, had only had 55 percent of the SCS quota filled. Since nearly full harvests or overharvests have typically occurred for the LCS complex, application of underharvest to LCS base quota to future seasons has not been an issue. The economic impact of reducing the amount of underharvest that could be applied to the base quota would depend on the amount of the underharvest, but would most likely have the largest economic effects for SCS. In addition, since there would be no regions or seasons under alternative suite 2, the amount of SCS underharvests expected from a full year of fishing in all regions is unknown at this time.

However, unlike the status quo, underharvests for species where the status of the species is unknown, overfished, or experiencing overfishing would not be transferred to the next season's quota. This could have a negative economic impact depending on the quota. For instance, the overfished/overfishing status of sandbar sharks and the unknown status of the LCS complex would preclude any carryover of underharvest of the sandbar or non-sandbar LCS quota. However, given the reduced sandbar quota and since the non-sandbar LCS quota is based on current catches of LCS species (except sandbar sharks), underharvests of sandbar sharks or non-sandbar LCS are not anticipated. Therefore, this may not result in negative socioeconomic impacts. In addition, underharvest carry-overs are currently not applied for pelagic sharks. Since the status of all pelagic sharks are either unknown or overfished, this would not change compared to the status quo.

Finally, alternative suite 2 would require that all shark fins (dorsal, second dorsal, pectoral, pelvic, anal, and caudal fins) remain naturally attached to the shark through landing. In the short-term, this alternative could change the foundation of the U.S. Atlantic shark fin market. At this time and since the fishery began in the 1980s, most shark fins sold in the United States are landed separately from the shark. In 1993, shark fins were required to be removed from the vessel at the first port of landing. This prevented fishermen from drying shark fins onboard their vessel over time in order to increase the value of the fin. Under alternative suite 2, shark fishermen would not be allowed to remove the fins from the shark until sharks are landed. Costa Rica has implemented a similar regulation that allows fishermen to cut the fins mostly off the

shark, as long as a small piece of skin keeps the fins attached to the shark until landing. According to a discussion on the Elasmo-L listserve, this practice has allowed fishermen to receive the expected revenues for both the fin and the meat because the fin could be fully removed from the shark at the dock without thawing the shark. The vessel owner/operator would need to decide whether the benefit of selling the fins separate from the shark outweighs the cost of having the crew remove the fins at landing. While the fins would likely still be of high quality once dry, it is unlikely that the ex-vessel price of fins packed in ice with the rest of the shark would be as high as fins that had begun drying. Additionally, if the shark cannot be packed in ice properly due to maintaining the fins on the shark, the quality of the meat, and therefore its value, could also decrease. The social impact of requiring sharks be landed with their fins on may be realized as the market adjust itself to accepting all wet fins. However, the overall socioeconomic impact of this could be significant given the reductions in the overall sandbar quota, which are the most lucrative shark due to the value of its fins.

Directed permit holder impacts

On average, directed permit holders landed 1,286,447 lb dw of sandbar sharks and 1,498,111 of non-sandbar LCS from 2003 to 2005 based on Federal and state shark dealer reports (landings by permit type were based on percentage of total landings by permit type in the Coastal Fisheries and HMS logbooks). In 2006 ex-vessel prices, this is equivalent to annual gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). If gross revenues for directed permit holders are averaged across the approximately 143 active directed shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $33,000 from shark revenues. Under alternative suite 2, gross revenues for directed permit holders would be estimated to be $1,333,417 (Table 4.10). This is a 72-percent overall reduction in gross revenues compared to 2003 to 2005 (Table 4.10). These reduced gross revenues averaged across the 143 active directed permit holders are just over $9,000 per directed shark fishing vessel. Since the states of Florida, New Jersey, and North Carolina have the most directed shark permits (Table 3.32), these states would be most negatively impacted by alternative suite 2.

In addition, retention of sandbar sharks on PLL gear would be prohibited under alternative suite 2. On average, 80,825 lb dw of sandbar sharks were reported landed on PLL gear by directed shark permit holders from 2003 to 2005 (HMS logbook data). In 2006 ex-vessel prices, this is equivalent to $117,510 in gross revenues. Given an average of 16.7 vessels landed sandbar sharks with PLL gear from 2003 to 2005, prohibition of sandbar sharks on PLL gear could result in a loss of gross revenues of $7,037 per vessel ($117,510 / 16.7 vessels = $7,037 per vessel).

Gross revenues under the status quo revenue were based on a 4,000 lb dw LCS trip limit for directed shark permit holders. The average number of sandbars and non-sandbar LCS landed per trip was 35 sandbars and 32 non-sandbar LCS for all gear types reported in the Coastal Fisheries and HMS Logbooks. Based on 2006 ex-vessel prices, this is equivalent to $4,101 per trip (Table 4.11). Revenue estimates on a regional trip basis were also based on species composition data attained from the BLL observer

program data (Hale and Carlson, 2007). Observer data indicate that between 2005 and 2006, 69 sandbar sharks and 35 non-sandbar LCS were caught per trip in the South Atlantic region, and 30 sandbar sharks and 83 non-sandbar LCS were caught per trip in the Gulf of Mexico region (Hale and Carlson, 2007). Based on these numbers and 2006 ex-vessel prices, South Atlantic trips averaged $4,743/trip and Gulf of Mexico trips averaged $5,853/trip (Table 4.11) (whereas the overall averaged gross revenues for directed shark permit holders was estimated as $4,101 per trip; Table 4.11).

Under alternative suite 2, the retention limits are 8 sandbars/trip and 21 non-sandbar LCS/trip. Non-sandbar LCS retention limits are based on the average ratio of sandbars to non-sandbar LCS caught in the South Atlantic and Gulf of Mexico regions to limit sandbar shark discards by fishermen deploying non-selective gear (Hale and Carlson, 2007). In the Gulf of Mexico, the ratio of sandbars to other LCS caught is 1:4, which based on an 8 sandbar/trip retention limit, would equal 32 non-sandbar LCS/trip. However, such a high non-sandbar LCS retention limit would result in a sandbar discards in the South Atlantic (~65.3 mt dw). A 21 non-sandbar LCS/trip retention limit was set to balance discards versus catch in the two regions (see Table A.4). This results in approximately 5 sandbar sharks being caught in the Gulf of Mexico region when the non-sandbar LCS retention limit/trip is filled (and therefore, only 86.1 mt dw of the sandbar quota would be filled). Therefore, gross revenues (including fins) on a trip basis are estimated to be $1,262 of gross revenue per trip in the South Atlantic and $1,333 of gross revenue per trip in the Gulf of Mexico (Table 4.12). From 2003 to 2005, there were 124 vessels that averaged more than 324 lb dw (or 8 sandbar sharks) of sandbar/trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 2.

Incidental permit holder impacts

On average, 66 incidental permit holders landed 12,994 lb dw per year of sandbar sharks and 46,333 lb dw per year of non-sandbar LCS from 2003 to 2005 based Federal and state shark dealer reports and Coastal Fisheries and HMS logbook data. Using 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). Gross revenues averaged across the 66 vessels with incidental permits landing sharks were $1,614 per vessel. Since incidental permit holders would not be able to land any sharks under alternative suite 2, the 66 active vessels would be most negatively affected by this alternative suite. The states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders as of 2007 (144, 37, 20, and 16, respectively; Table 3.32); therefore, these states would be most negatively impacted by alternative suite 2.

Time/Area Closures

Under alternative suite 2, NMFS would maintain the mid-Atlantic shark closed area and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the economic impacts associated with the closures would be the same as described under alternative suite 1.

However, under alternative suite 2, NMFS would consider implementing the South Atlantic Fishery Management Council's marine protected areas (MPAs). Based on observer program data, the number of sets and targeted catch in the preferred MPAs is considered to be minimal. The preferred MPAs are generally small (< 10 miles wide) and vessels should be able to make minor adjustments to fishing locations to avoid the MPAs. Most of the observed shark BLL sets occurred shoreward of the MPAs. Affected vessels would forego some loss of revenue from the reduced bycatch of grouper and other species caught on shark BLL sets in the proposed MPAs, however, these losses are expected to be minimal. Based on the expanded catch estimates (Siegfried et al., 2006b), the total numbers of shark catches for the proposed MPAs were 25,395 and this equates to approximately $1,512,227 based on 2006 ex-vessel prices for shark (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 3.42). However, this may be an overestimate if all the catches did not occur in the MPAs. Since there are approximately 285 shark limited access permits in Florida, this would amount to a loss of revenue of approximately $3,722 per vessel per year in Florida.

Reporting

The reporting burden would be increased significantly for Atlantic shark dealers as a result of this alternative suite resulting in negative economic impacts. Currently, shark dealer reports must be submitted bimonthly, regardless of whether or not the dealer actually purchased any shark products. Reporting frequency would be increased to 24 hours of when shark products were purchased. While the increased reporting burden would not impact shark dealer expenditures per se, it would result in more time spent submitting dealer reports, which represents an opportunity cost for dealers since that would be time they could not spend conducting other activities related to their business. Furthermore, in order to comply with the requirement that dealer reports must be *received* by the Agency within 24 hours, it is assumed that dealers would have to submit dealer reports electronically or via facsimile. Dealers that do not currently possess a computer or fax machine would have to purchase one of these items. The increased reporting burden implemented in this alternative suite would be subject to authorization under the Paperwork Reduction Act. Reporting requirements for shark vessel permit holders, including the need to take an observer if selected and the need to submit vessel logbooks within seven days of completing a fishing trip would not be modified, resulting in neutral economic impacts.

Alternative suite 2 and 3 would modify the procedure for accounting for sharks that are reported by dealers as unclassified or unidentified. Currently, these sharks are counted against the LCS quota. This would be modified such that these sharks would be classified as sandbar sharks. As a result of the proposed measures, sandbar sharks would have the lowest commercial quota. However, sandbars have the highest commercial value of any Atlantic shark because of their fin. The intent of this requirement is to improve the accuracy of dealer reports and number of dealer reports that include species specific information on all sharks that are purchased. These data form the basis of quota monitoring and stock assessments. Furthermore, if shark dealers mis-identify the species

of shark being purchased in order to keep the sandbar shark season open longer, this may result in overharvests. While the short-term impacts of this measure may be negative as it would require more of the dealer's time to properly identify sharks, long-term effects may be positive. Potential overharvests or inappropriately short seasons coupled with potentially inaccurate stock assessments results could occur as a result of mis-identified or unidentified landings included in dealer reports. This measure coupled with mandatory shark identification workshops for shark dealers and the proposed requirement for fishermen to leave all shark fins attached to sharks at first point of landing could improve the accuracy of shark dealer reports.

Seasons

Coupled with the measures included under regions (Section 4.2.6), this alternative suite would likely have negative economic impacts on vessels and dealers in the North Atlantic. Opening seasons simultaneously in all regions would provide an advantage to vessels participating in shark fisheries in the South Atlantic and Gulf of Mexico regions as these regions have higher numbers and a wider variety of LCS and SCS sharks present year-round. Participants in the North Atlantic region would suffer as they would not be able to fish for sharks starting January 1 (since sharks would not have migrated north at this time), unless they moved to fish in another region. Moving to other regions to fish may not be cost effective with reduced quotas and retention limits for sandbar and non-sandbar LCS. Historically, these participants have only had significant landings of LCS and pelagic sharks. There is a possibility that the quota could be filled and the season closed for sandbar and non-sandbar LCS before participants in the North Atlantic have had the opportunity to land these sharks once they became available in this region. Furthermore, the fact that sandbar and non-sandbar LCS would both close regardless of which quota is filled, to minimize bycatch and dead discards of sandbar sharks, would exacerbate the negative economic impacts. Landings in the North Atlantic regions have averaged 48.2 mt dw per year for LCS (including sandbar sharks) between 2003 and 2006. The majority of these LCS were landed between April and June in the North Atlantic region. Assuming that the entire quota is filled, and seasons for sandbar and non-sandbar LCS are closed before April, this could result in losses in gross revenues of approximately $108,387 for vessels in the North Atlantic, based on 2005 ex-vessel prices (LCS = $1.02 per lb dw in the North Atlantic; $1.02 lb dw x 106,262 lb dw = $108,387; no price information is available for fins in the North Atlantic; Table 3.42). There are 107 directed and incidental shark permit holders in the states that comprise the North Atlantic region; therefore, losses are anticipated to be around $1,013 in gross revenues per vessel ($108,387 total gross revenues / 107 vessels = $1,013 per vessel). However, depending on their past involvement in the shark fishery, economic impacts to individual vessel owners would vary.

Vessels and dealers in the South Atlantic and Gulf of Mexico regions could experience a comparative advantage over vessels in the North Atlantic, however, reduced quotas and retention limits for sandbar sharks and non-sandbar LCS sharks would result in negative economic impacts for vessels and dealers in all locales. Furthermore, closing both non-sandbar LCS and sandbar sharks to minimize bycatch and dead discards of sandbar sharks on BLL gear would also result in negative economic impacts as this may

result in a portion of either quota being unutilized. There is a possibility that the reduced retention limits for sandbar and non-sandbar LCS sharks, coupled with the increased reporting frequency for dealers may result in minor positive economic impacts by keeping shark fishing seasons for LCS and sandbar sharks open for an extended portion of the year. In 2006, shark seasons for LCS were open a total of 4, 19, and 18 weeks in the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. The first trimester was excluded from the North Atlantic calculation as landings for LCS are almost zero during these months (January – April). In 2007, shark seasons for LCS were 3, 4, and 5 weeks for the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. Extensive over harvests in 2006 were responsible for short seasons in 2007. The retention limits associated with this alternative suite should result in longer shark seasons, which may have some minor economic impacts as it may provide for a greater proportion of the year when vessels could land and sell shark products.

Regions

As stated in Section 4.2.6, this alternative suite would likely have negative economic impacts on regions that do not have sharks present year round. The North Atlantic region could be disadvantaged as a result of reverting back to one region, versus three, as they would not have a secure regional trimester quota which increased the likelihood that they would have a shark fishery in adjacent waters when sharks are present. Vessels could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. Dealers in all regions, but particularly in the North Atlantic region, would also be affected, possibly even more so than vessels, as the likelihood of having shark products consistently would be decreased.

Recreational Measures

Participants in recreational shark fisheries may experience negative economic impacts as a result of reducing the number of sharks that could be legally landed (Table 4.8). Charter/Headboat operators would be most affected as a result of these measures as they may see a reduction in the number of charters that customers are willing to hire. These impacts may be most pronounced in areas where blacktip sharks are frequently encountered, including the South Atlantic and Gulf of Mexico regions. Recreational landings data indicate that there are more landings of blacktip sharks than any other species that could no longer be possessed as a result of this alternative suite. It is presumed that blacktip sharks are kept more than any other LCS because of the higher quality of their flesh and the fact that they are more abundant than other LCS in coastal waters. Charter/Headboat operators specializing in sharks may see the number of charters decline because some fishermen insist on keeping blacktip or sandbar sharks. Prohibiting the other species (finetooth, silky, bull, blacknose, and porbeagle) is not expected to have adverse impacts as these species are not as frequently encountered in recreational fisheries for sharks.

Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of prohibiting six additional species of sharks for retention

in recreational fisheries. The majority of tournaments specializing in sharks are in the North Atlantic region: specifically Rhode Island, New York, and Massachusetts. In 2007, there were 59 tournaments/year with prize categories for pelagic sharks (Table 3.38, Chapter 3). Species most commonly targeted in these tournaments including common thresher, oceanic whitetip, blue, shortfin mako, and porbeagle. Of these, only porbeagle would be prohibited from retention as stocks are overfished. Tournaments are generally won by shortfin mako or common thresher, therefore, significant economic impacts as a result of prohibiting porbeagle retention in shark fishing tournaments are not anticipated.

6.4.3 Alternative Suite 3: Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders

Species Complexes

Under alternative suite 3, NMFS would structure species complexes as they are outlined for alternative suite 2. Therefore, the economic impacts of species complexes would be the same as described in alternative suite 2. The associated economic impacts of the reduced quotas for sandbar sharks and non-sandbar LCS are discussed in combination with the next section on retention limits.

Quotas and Retention Limits

Alternative suite 3 would allow sharks to be retained by shark directed and incidental permit holders. Therefore, the available sandbar and non-sandbar LCS quota would be spread over a larger universe of commercial permit holders. However, unlike the status quo or alternative suite 2, the retention limits for sandbar sharks and non-sandbar LCS would be the same for both directed and incidental permit holders. Due to the reduced sandbar shark quota and for ease of enforcement, NMFS proposed to remove the distinction between the two classes of permit in terms of retention limits for sandbar sharks and non-sandbar LCS. Since directed permit holders presumably make a greater percentage of their gross revenues from shark landings, they are expected to have larger negative socioeconomic impacts compared to incidental permit holders. Since the states of Florida, New Jersey, and North Carolina have the most directed permit holders it is anticipated that these states would have the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32). As with alternative suite 2, shark dealers could also experience negative impacts due to the reduction in the sandbar and non-sandbar LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

As with alternative suite 2, NMFS would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota under alternative suite 3. The economic impacts of this quota are the same as those discussed in Section 6.4.2.

Fishery level impacts

Under alternative suite 3, the commercial quotas would be reduced to 116.6 mt dw for sandbar sharks and 541.2 mt dw for non-sandbar LCS. However, given the non-sandbar LCS retention limit, only 105.9 mt dw (233,467 lb dw) of the sandbar quota and 229.2 mt dw (505,294 lb dw) of non-sandbar LCS quota would be landed under alternative suite 3 to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico (see discussion in Appendix A under "*Non-sandbar quota and retention limits"* and Tables A.4 and 4.2). Based on 2006 ex-vessel prices, assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight, this is equivalent to $1,294,603 (Table 4.13). This is a reduction of about 74 percent compared to the current gross revenues under alternative suite 1 ($4,903,001; Table 4.9).

As with alternative suite 2, porbeagle sharks would be placed on the prohibited list under alternative suite 3. Based on the average porbeagle shark landings from 2003 to 2006 (1.7 mt dw or 3,867 lb dw) and 2006 ex-vessel prices, this is equivalent to a $7,378 gross revenue loss in porbeagle shark landings under alternative suite 3 (Table 4.9).

In alternative suite 3, under and overharvests of quota for each category would be removed from the next season's quota. Therefore, the socioeconomic impacts associated with the application of under and overharvests would be the same as described under alternative suite 2.

Finally, alternative suite 3 would require that shark fins remain attached to the shark through the first port of landing. As described under alternative suite 2, the overall socioeconomic impact of this could be significant given the reductions in the overall sandbar quota, which are the most lucrative shark due to the value of its fins. Therefore, the impacts of requiring that shark fins remain attached to the shark during the first port of landing are anticipated to be the same as described under alternative suite 2.

Directed permit holder impacts

As stated under alternative suite 2, on average, directed permit holders landed 1,286,447 lb dw of sandbar sharks per year and 1,498,111 lb dw of non-sandbar LCS per year from 2003 to 2005 based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, under alternative 3, the available sandbar and non-sandbar LCS quota would be spread over directed and incidental permit holders. Based on past effort, it was assumed 1,108 trips could be made by directed permit holders (Table 4.14). This is 78 percent of the total expected fishing effort (Table 4.14). Therefore, given 105.9 mt dw (233,467 lb dw) of sandbar and 229.2 mt dw (505,294 lb dw) of non-sandbar LCS that could be landed under alternative suite 3, approximately 83 mt dw (183,073 lb dw) of sandbar quota and 180 mt dw (396,225 lb dw) of the non-sandbar LCS quota are anticipated to be landed by directed permit holders (Table 4.14). Based on 2006 ex-

vessel prices, this is equivalent to $1,015,162 gross revenues for directed permit holders. This is a 78-percent overall reduction in gross revenues compared to 2003 to 2005 (gross revenues based on current directed permit holders' landings were $4,702,031; Table 4.9). Again, since the states of Florida, New Jersey, and North Carolina have the most directed permit holders it is anticipated that these states would experience the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32).

As stated in alternative 2, the status quo revenue was based on a 4,000 lb dw LCS trip limit for directed shark permit holders with average South Atlantic trips at $4,743/trip and average Gulf of Mexico trips at $5,853/trip (Table 4.11). Under alternative suite 3, the retention limits are 4 sandbars/trip and 10 non-sandbar LCS/trip. However, since the ratio of sandbars to non-sandbar LCS caught in the Gulf of Mexico is 1:4, only ~ 3 sandbar sharks would be caught in the Gulf of Mexico region when the 10 non-sandbar LCS retention limit/trip is filled (10 non-sandbar LCS / 4 = 2.5 sandbar sharks). Therefore, gross revenues on a trip basis are estimated to be $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). From 2003 to 2005, there were 128 vessels that averaged more than 163 lb dw (or 4 sandbar sharks) of sandbar/trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 3.

Incidental permit holder impacts

On average, incidental permit holders landed 12,994 lb dw of sandbar sharks and 46,333 lb dw of non-sandbar LCS based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). The available sandbar and non-sandbar LCS quotas were averaged over directed and incidental permit holders under alternative suite 3. Based on past effort, it was assumed 305 trips could be made by incidental permit holders (Table 4.14). This is 22 percent of the expected fishing effort (Table 4.14). Therefore, given the 105.9 mt dw (233,467 lb dw) of the sandbar quota and 229.2 mt dw (505,294 lb dw) of the non-sandbar LCS quota that could be landed under alternative suite 3, approximately 23 mt dw (50,395 lb dw) of sandbar quota and 50 mt dw (109,069 lb dw) of the non-sandbar LCS quota are anticipated to be landed by incidental permit holders (Table 4.14). Based on 2006 ex-vessel prices, this is equivalent to $279,441 gross revenues for incidental permit holders (Table 4.14). This would result in gross revenues that are 2.6 times higher compared to 2003 to 2005 (gross revenues based on current incidental permit holders' landings were $106,491; Table 4.9).

This increase in gross revenues is due to the increase in retention limits for incidental permit holders. Under the status quo, incidental permit holders can retain 5 sharks from the LCS complex. However, under alternative suite 3, incidental permit holders would be able to retain 4 sandbars and 10 non-sandbar LCS or 14 LCS total. This retention limit is almost 3 times higher than what is currently allowed under the status quo. On average, incidental permit holders have been landing 2 sandbar sharks and 3 non-sandbar LCS per trip. Based on 2006 ex-vessel prices, this is equivalent to $307 per trip (Table 4.11). However, under alternative suite 3, incidental permit holders would

make equivalent gross revenues per trip as directed permit holders: $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). This would result in gross revenues for incidental permit holders that are 2 to 3 times higher than gross revenues in 2003 to 2005 depending on future fishing effort and catch composition. Therefore, there would be positive economic impacts for incidental permit holders under alternative suite 3. Since approximately 66 vessels with incidental permit holders landed sandbar sharks or non-sandbar LCS in 2003 to 2005 in the Coastal Fisheries and HMS Logbooks, these 66 vessels would have the largest economic benefits under alternative suite 3. However, if sharks become profitable for incidental permit holders under alternative suite 3, then more vessels with incidental permits may actively land sandbars and non-sandbar LCS in the future. Finally, the states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders in 2007 (Table 3.32). Therefore, these states would see the largest socioeconomic benefits under alternative suite 3.

Time/Area Closures

Under alternative suite 3, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the economic impacts associated with these closures would be the same as described under alternative suite 1. In addition, under alternative suite 3 NMFS would implement the South Atlantic Fishery Management Council MPAs as described under alternative suite 2. Therefore, the economic impacts associated with the MPAs would be the same as described in alternative suite 2.

Reporting

This alternative suite could result in neutral economic impacts. Shark dealers would still be required to submit landings data twice a month, however, they would need to ensure that it is actually *received* by the Agency within 10 days of a bimonthly reporting period ending. Currently, shark dealers simply have to ensure that the landings reports submitted to NMFS are *post-marked* within 10 days of the end of a reporting period. Additional burden is not expected as a result of modifying the regulations to ensure that dealer reports are actually received. Furthermore, more timely reporting and receipt of information by the Agency may result in a decreased likelihood that quotas would be exceeded and overharvests removed from forthcoming shark seasons resulting in neutral or slightly positive economic impacts.

As described in alternative suite 2, this suite would change how sharks listed as unclassified on shark dealer reports are accounted for. Unclassified sharks would be counted as sandbar sharks, and not as LCS, which is the current procedure. Properly identifying sharks would result in negative economic impacts in the short-term because it takes more time. Submission of accurate shark dealer data may result in positive economic impacts in the long-term as it would improve quota monitoring, decrease the likelihood of extensive overharvests and subsequent closures, and improve the results from stock assessments by ensuring data is more accurate and includes species specific information.

Seasons

When coupled with the measures included under regions (Section 4.2.5), this alternative suite would likely have negative economic impacts on vessels and dealers in the North Atlantic. Opening seasons on January 1, in all regions, would provide an advantage to vessels participating in shark fisheries in the South Atlantic and Gulf of Mexico regions as these regions have large numbers and a wider variety of LCS and SCS sharks present year-round. Participants in the North Atlantic region would suffer as they would not be able to fish for sharks starting January 1 (since sharks would not have migrated north at this time), unless they moved to fish in another region. This is not likely as a result of the reduced quotas and retention limits for sandbar and non-sandbar LCS sharks. Historically, these participants have only had significant landings of LCS and pelagic sharks. There is a possibility that the quota could be filled and the season closed for sandbar and non-sandbar LCS before participants in the North Atlantic have had the opportunity to land these sharks once they became available in this region. Furthermore, the fact that sandbar and non-sandbar LCS would both close regardless of which quota is filled to minimize bycatch and dead discards of sandbar sharks would exacerbate the negative economic impacts. Landings in the North Atlantic regions have averaged 62.3 mt dw/year for LCS (including sandbar sharks) between 2004-2006. The majority of LCS are landed in the second trimester in the North Atlantic region. Assuming that the entire quota is filled, and seasons for sandbar and non-sandbar LCS are closed before these sharks migrate to the North Atlantic region this would result in losses in gross revenues of approximately $32,963 in 2005 ex-vessel prices (Table 3.42). There are 107 directed and incidental shark permit holders in the states that comprise the North Atlantic region; therefore, losses are anticipated to be around $308 in gross revenues per vessel ($32,963 total gross revenues / 107 vessels = $308 per vessel). However, depending on their past involvement in the shark fishery, economic impacts to individual vessel owners would vary.

Vessels and dealers in the South Atlantic and Gulf of Mexico regions would experience a comparative advantage over vessels in the North Atlantic, however, reduced quotas and retention limits for sandbar sharks and non-sandbar LCS sharks would result in negative economic impacts for vessels and dealers in all locales. Furthermore, closing both non-sandbar LCS and sandbar sharks to minimize bycatch and dead discards of sandbar sharks on BLL gear would also result in negative economic impacts as this may result in a portion of either quota being unutilized. There is a possibility that the reduced retention limits for sandbar and non-sandbar LCS sharks may result in minor positive economic impacts by keeping shark fishing seasons for LCS and sandbar sharks open for an extended portion of the year. In 2006, shark seasons for LCS were open a total of 4, 19, and 18 weeks in the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. The first trimester was excluded from the North Atlantic calculation as landings for LCS are almost zero during these months (January – April). In 2007, shark seasons for LCS were 3, 4, and 5 weeks for the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. Extensive over harvests in 2006 were responsible for short seasons in 2007. This alternative suite may result in longer shark seasons which may have some minor economic impacts as it may provide for a greater proportion of the year when vessels could land and sell shark products.

Regions

Similar to alternative suite 2, establishing one region would likely have negative economic impacts on regions that do not have sharks present year round. The North Atlantic region would be disadvantaged as a result of reverting back to one region, versus three, as they would not have a secure regional trimester quota which increased the likelihood that they would have a shark fishery in adjacent waters when sharks are present. Vessels could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. Dealers in the North Atlantic region would also be affected, possibly even more so than vessels, as the likelihood of having shark products consistently would be decreased.

Recreational Measures

As described under alternative suite 2, participants in recreational shark fisheries would experience negative economic impacts as a result of reducing the number of sharks that could be legally landed (Table 4.8). Charter/Headboat operators would be most affected as a result of these measures as they may see a reduction in the number of charters that customers are willing to hire. These impacts may be most pronounced in areas where blacktip sharks are frequently encountered, including the South Atlantic and Gulf of Mexico regions. Recreational landings data indicates that there are more landings of blacktip sharks than any other species. It is presumed that blacktip sharks are kept more than any other LCS because of the higher quality of their flesh and the fact that they are more abundant than other LCS in coastal waters. Charter/Headboat operators specializing in sharks may see the number of charters decline because some fishermen may not want to pay for a fishing trip if they are not allowed to retain blacktip or sandbar sharks. Prohibiting the other species (finetooth, silky, bull, blacknose, and porbeagle) is not expected to have adverse impacts as these species are not as frequently encountered in recreational fisheries for sharks.

Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of prohibiting six additional species of sharks for retention in recreational fisheries. The majority of tournaments specializing in sharks are in the North Atlantic region, specifically Rhode Island, New York, and Massachusetts. In 2007, there were 59 tournaments/year with prize categories for pelagic sharks (Table 3.38, Chapter 3). Species most commonly targeted in these tournaments include common thresher, oceanic whitetip, blue, shortfin mako, and porbeagle. Of these, only porbeagle would be prohibited from retention as stocks are overfished. Tournaments are generally won by shortfin mako or common thresher, therefore, significant economic impacts as a result of prohibiting porbeagle retention in shark fishing tournaments are not anticipated.

6.4.4 Alternative Suite 4: Establish a Research Fishery for Sandbar Sharks; Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders – Preferred Alternative

Species Complexes

Under alternative suite 4, NMFS would structure species complexes as they are outlined for alternative suites 2 and 3. Therefore, the economic impacts associated with species complexes would be the same as described in alternative suite 2. The associated economic impacts of the quota reductions for sandbar sharks and non-sandbar LCS and the division of those quotas among vessels inside and outside of a research fishery are described in the next section in combination with retention limits. A primary difference between the measures proposed under alternative suite 4 in the DEIS and the final measures in the FEIS is that porbeagle sharks would no longer be placed on the prohibited species list. These species would be authorized in commercial and recreational fisheries; however, there would be a reduced TAC for these species based on current landings and discards. The associated economic impacts of this are discussed below under quotas and retention limits.

Quotas and Retention Limits

Alternative suite 4 would establish a shark research fishery for sandbar sharks (See Section 4.4 and "*Fishery level impacts*" in this section for additional information). Only incidental or directed permit holders that apply and are selected to participate in this program could land sandbar sharks. If the dealer infrastructure is impacted by business closures, participants in the research fishery may have difficulty marketing their catch. Vessels not participating in the research program would still be able to land non-sandbar LCS, SCS, and pelagic sharks subject to the retention limits described in Chapter 2 and Appendix C (Table 2.1 and C.4). Based on the limited number of vessels that would be in the shark research fishery, most current directed and incidental permit holders would not be allowed to land sandbar sharks, resulting in negative socioeconomic impacts for these permit holders. In addition, given the reduced non-sandbar LCS trip limit for vessels outside the research fishery and since directed permit holders presumably make a larger percentage of their gross revenues from shark landings, it is anticipated that there would be greater negative socioeconomic impacts on directed permit holders outside the research fishery compared to incidental permit holders. Since Florida, New Jersey, and North Carolina have the most directed and incidental shark incidental permit holders, it is anticipated that these states would have the largest negative socioeconomic impacts resulting from the reduced non-sandbar LCS retention limits (Table 3.32). As with alternative suites 2 and 3, shark dealers could also experience negative impacts due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed. Furthermore, there may be some acute regional impacts on dealers in areas not covered by the limited research fishery, despite the fact that NMFS would try to allocate fishing effort throughout the regions.

Under the preferred alternative suite 4, porbeagle sharks would be authorized in recreational and commercial fisheries, but under a reduced TAC of 11.3 mt dw. Of this, a

commercial quota of 1.7 mt dw would be established for the commercial fishery. Currently the commercial quota for porbeagle sharks is 92 mt dw per year, however, this commercial quota has never been met. NMFS would set a new TAC for porbeagle sharks that would cap effort at its present level. Based on quota monitoring (which includes vessel trip reports) from 2003 to 2006, on average, 3,867 lb dw of porbeagle sharks were landed per year. Based on 2006 ex-vessel prices, this is equivalent to $7,378 in gross revenues (Table 4.9). Since commercial fishermen would be allowed to continue to land porbeagle sharks at this level, there are no anticipated immediate economic impacts of implementing the TAC. However, a reduction of the commercial quota from 92 mt dw to 1.7 mt dw would limit the porbeagle shark fishery's ability to expand in the future. The loss of this expansion option results in an economic opportunity cost associated with this forgone future opportunity. It should also be noted that ICCAT Recommendation 07-06 requests that participating countries limit directed fisheries for porbeagle and reduce fishing mortality for porbeagle sharks, thus also limiting the future expansion of this fishery. In addition, recreational anglers would still be allowed to land porbeagle sharks. Therefore, there are no negative economic impacts for recreational fishermen associated with the TAC.

As with alternative suites 2 and 3, NMFS would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota under alternative suite 4. Therefore, the socioeconomic impacts associated with the 60 mt ww shark display and research quota would be the same as described for alternative suites 2 and 3.

In alternative suite 4, under and overharvests would be applied to the next season or over multiple years. Therefore, NMFS anticipates that the socioeconomic impacts of the application of under and overharvests would be similar as described for alternatives suites 2 and 3. In addition, alternative suite 4 would require that shark fins remain on the shark through the point of offloading. As with alternative suites 2 and 3, the overall socioeconomic impact of this could be significant given the reduction in the sandbar quota, which is the most lucrative shark due to the value of its fins in comparison with other sharks. Therefore, the socioeconomic impacts associated with landing sharks with their fins on would be the same as described for alternative suite 2.

Fishery level impacts

Base Quotas

Shark Research Fishery - Based on public comment, NMFS would establish a separate non-sandbar LCS base quota for the research fishery. In the DEIS, it was determined that while fishermen in the research fishery harvested the sandbar shark base quota of 116.6 mt dw, they would also harvest approximately 50 mt dw of the non-sandbar LCS quota (see Appendix A). Thus, to allow the research fishery to remain open if the non-sandbar LCS quota is filled outside the research fishery, NMFS would formally allocate 50 mt dw of non-sandbar LCS base quota to the research fishery. Thus, NMFS would close the sandbar shark research fishery when the quota reaches 80 percent (*i.e.*, if the non-sandbar LCS quota with the research fishery reached 80 percent, non-sandbar LCS retention in the research fishery would end, but sandbar sharks could continue to be

retained until that sandbar quota reached 80 percent). This should allow for the research fishery to continue year-round. In addition, fishermen within the research fishery could harvest the entire sandbar shark base quota of 116.6 mt dw. Given these sandbar and non-sandbar LCS base quotas, fishermen operating within the research fishery, based on 2006 ex-vessel prices, could make $582,034 in gross revenues of sandbar and non-sandbar LCS landings (Table 4.18). Since 5 to 10 vessels are anticipated to participate in the research fishery, NMFS estimates that a vessel could make between $116,407 (*i.e.*, 5 boats) to $58,203 (*i.e.*, 10 boats) in gross revenues on sandbar shark and non-sandbar LCS landings.

Outside the Research Fishery - Vessels operating outside of the research fishery would have a regional non-sandbar LCS base quota of 188.3 mt dw (415,126 lb dw) in the Atlantic region and 439.5 mt dw (968,922 lb dw) in the Gulf of Mexico region. In 2006 ex-vessel prices, this is equivalent to $517,657 in the Atlantic region and $1,433,034 in gross revenues in the Gulf of Mexico region (Table 4.18).

In total, vessels operating within, and outside, of the research fishery are expected to have gross revenues of $2,532,725 in sandbar and non-sandbar LCS landings under the base quotas (Table 4.18). This is a 48-percent reduction in gross revenues from sandbar sharks and non-sandbar LCS under the status quo (gross revenues based on current directed and incidental permit holders' landings were $4,903,001; Table 4.9). However, this is less of a reduction compared to alternative suites 2 and 3 because the entire sandbar and non-sandbar LCS quotas could be harvested under alternative suite 4. Because the States of Florida, Louisiana, New Jersey, and North Carolina have the most incidental and directed shark permit holders (Table 3.32), NMFS anticipates that these states would have the largest negative socioeconomic impact by these reductions in quotas of different shark species.

Adjusted Quotas

Shark Research Fishery - Based on overharvests of the LCS complex in 2007, NMFS would adjust the base quotas to account for the overharvests (see Appendix C for more details). These overharvests would be spread over five years to allow the research fishery to begin in 2008. The adjusted sandbar shark quota within the research fishery would be 87.9 mt dw and the adjusted non-sandbar LCS quota for the shark research fishery would be 37.5 mt dw. For fishermen operating within the research fishery, based on 2006 ex-vessel prices, NMFS estimates that vessels operating in the research fishery could make $437,963 in gross revenues from sandbar and non-sandbar LCS landings (Table 4.18). Since 5 to 10 vessels are anticipated to participate in the research fishery, NMFS estimates that an individual vessel could make between $87,593 (*i.e.*, 5 boats) to $43,796 (*i.e.*, 10 boats) in gross revenues on sandbar shark and non-sandbar LCS landings.

Outside the Research Fishery - In the Gulf of Mexico region, the adjusted quota would be 390.5 mt dw, and the adjusted non-sandbar LCS quota for the Atlantic region would be 187.8 mt dw. Based on these adjusted quotas, vessels operating outside of the research fishery could expect gross revenues of $516,285 in the Atlantic region and

$1,273,269 in the Gulf of Mexico region on non-sandbar LCS landings, based on 2006 ex-vessel prices (Table 4.18).

In total, vessels operating within, and outside, of the research fishery are expected to have gross revenues of $2,227,517 in sandbar and non-sandbar LCS landings (Table 4.18). This is a 55-percent reduction in gross revenues from sandbar sharks and non-sandbar LCS under the status quo (gross revenues based on current directed and incidental permit holders' landings were $4,903,001; Table 4.9).

Directed and Incidental permit holder impacts in the research fishery

Currently, directed permit holders have a 4,000 lb dw LCS trip limit. Vessels operating within a shark research fishery may experience similar trip limits, depending on the research objectives of the fishery. However, the overall base quota for sandbar sharks in the research fishery would be reduced to 116.6 mt dw. Assuming the catch composition is 70 percent sandbar sharks, and there is a 4,000 lb dw trip limit, 92 trips would fulfill the sandbar shark quota (see Section 4.4.2 and Appendix A, Table A.2). Given this catch composition, 30 percent of 4,000 lb dw trip would be non-sandbar LCS. If 92 trips were made with these trip limits and catch compositions, NMFS estimates that 50 mt dw of non-sandbar LCS would also be caught in the research fishery while harvesting the 116.6 mt dw of sandbar base quota (see Section 4.4.2 and Appendix A, Table A.5). Based on these landings under the base quotas, the research fishery would have estimated overall gross revenues of $582,034 or $6,329 per trip (Table 4.18). Similarly, the 87.9 mt dw of sandbar adjusted quota (Appendix C; Table C.2a) could be caught in approximately 69 trips (87.9 mt dw = 193,784 lb dw; 93,784 lb dw / 2,800 lb dw = 69 trips). If 69 trips were made to harvest the 87.9 mt dw of sandbar adjusted quota, NMFS estimates that, 37.5 mt dw of non-sandbar LCS quota would also be harvested in the shark research fishery (69 trips x 1,200 lb dw = 82,800 lb dw or 37.5 mt dw) (Table C.3). Based on these landings under the adjusted quotas, the research fishery would have estimated overall gross revenues of $437,963 or $6,347 per trip in gross revenues (assuming these are BLL trips; Table 4.18).

On average, directed permit holders reported 1,108 trips per year (using a combination of gear types) in the Coastal Fisheries and HMS logbooks that landed sandbar sharks and non-sandbar LCS from 2003 to 2005 (Table 4.11). While 92 trips represents a greater than 91-percent reduction in the average number of trips taken by directed permit holders from 2003 to 2005 (and 69 trips would be a 94-percent reduction), these trips would be divided across a much smaller universe of vessels, therefore, minimizing the economic impacts for vessels that are selected to participate in the research fishery. Since Florida, New Jersey, North Carolina, and Louisiana have the most directed shark incidental permit holders, NMFS anticipates that these states would have the largest negative socioeconomic impacts given the limitation of only a few vessels inside the research fishery being able to maintain higher trip limits than those vessels operating outside the research fishery.

Incidental permit holders took, on average, 305 trips per year that landed sandbar sharks and 347 trips per year that landed non-sandbar LCS in 2003 to 2005 (Table 4.11).

On average, they landed 2 sandbars and 3 non-sandbar LCS per trip for total estimated gross revenues of $307 per trip (Table 4.11). However, under alternative suite 4, if incidental fishermen are selected to participate within the research fishery, then they would have the same retention limits as directed shark permit holders, and therefore, receive the same gross revenues from shark landings as directed shark permit holders. Given gross revenues for directed shark permit holders would be $6,329 per trip under the base quotas (or $6,347 per trip under the adjusted quotas), the same gross revenues for incidental permit holders would be almost 21 times higher than gross revenues under the status quo ($6,329 /$307 = 20.6 times higher). Therefore, positive economic impacts may be realized by the few incidental permit holders that may participate in the research fishery.

Directed permit holders outside the research fishery

On average, directed permit holders landed 35 sandbar sharks and 32 non-sandbar LCS per trip based on the Coastal Fisheries and HMS logbooks (Table 4.11). This translated into gross revenues of $4,101 per trip in sandbar and non-sandbar LCS landings based on 2006 ex-vessel prices (Table 4.11). In total, directed permit holders made $4,702,031 in gross revenues from sandbar and non-sandbar LCS landings under the status quo (Table 4.9). Under the adjusted quota for alternative suite 4, directed permit holders operating outside the research fishery would still be able to retain 33 non-sandbar LCS per trip until the regional non-sandbar LCS quotas were filled. This trip limit translates into an average trip weight of 1,112 lb dw (33 non-sandbar LCS x 33.7 lb dw [average commercial weight of non-sandbar LCS] = 1,112 lb dw). Based on 2006 ex-vessel prices, this translates into $2,101 in gross revenues per trip (assuming 5 percent fin weight and 95 percent carcass weight). Given there were, on average, 1,108 directed trips reported in the Coastal Fisheries and HMS logbooks from 2003 to 2005, this would result in gross revenues of $2,327,908 for directed permit holders from non-sandbar LCS landings based on the adjusted trip limits.

After the overharvests have been accounted for in 5 years (at the end of 2012), NMFS would implement the base quotas, which would increase the retention limit for directed permit holders to 36 non-sandbar LCS per trip. These base quotas would result in slightly higher gross revenues; 36 non-sandbar LCS translates into 1,213 lb dw per trip, which is $2,293 per trip in gross revenues from non-sandbar LCS landings based on 2006 ex-vessel prices. Total gross revenues for directed permit holders based on 36 non-sandbar LCS per trip and 1,108 trips would be $2,540,644. However, gross revenues for directed permit holders from non-sandbar LCS landings on either a trip basis or total gross revenues would still be reduced by over 46-percent based on the trip limits for the adjusted and base non-sandbar LCS quotas Table 4.9). This is mainly due to the prohibition of sandbar sharks to fishermen operating outside the research fishery.

These reductions in gross revenues on a trip basis may be even larger when examined within a regional context. Under the status quo, shark fishermen made, on average, $4,743 per trip on sandbar and non-sandbar LCS landings in the Atlantic region, and $5,853 per trip in the Gulf of Mexico region (Table 4.11). Based on the trip limits under the adjusted quotas (33 non-sandbar LCS per trip), directed permit holders' gross

revenues on non-sandbar LCS would be $887 per trip in the Atlantic region and $1,645 per trip in the Gulf of Mexico. This is an 81-percent reduction in gross revenues per trip in the Atlantic region and 72-percent reduction in the Gulf of Mexico region (Table 4.11). Under the trip limits for the base quota (36 non-sandbar LCS per trip), directed permit holders' gross revenues on non-sandbar LCS would be $1,513 in the Atlantic region and $1,794 in the Gulf of Mexico region. This would be a 68-percent reduction in gross revenues per trip in the Atlantic region and a 69-percent reduction in the Gulf of Mexico region (Table 4.11). As stated above, these reductions in gross revenues are due to the prohibition of sandbar sharks outside the shark research fishery. Since an average of 141 vessels with directed shark permits reported sandbar landings in the Coastal Fisheries and HMS Logbooks from 2003 to 2005 and most directed permit holders are located in Florida, New Jersey, and North Carolina (Table 3.32), NMFS anticipates that active vessels in these states would be most negatively impacted by alternative suite 4.

Incidental permit holders outside the research fishery

On average, incidental permit holders landed 2 sandbar sharks and 3 non-sandbar LCS per trip based on the Coastal Fisheries and HMS logbooks (Table 4.11). This translated into gross revenues of $307 per trip in sandbar and non-sandbar LCS landings based on 2006 ex-vessel prices (Table 4.11). In total, incidental permit holders made $106,491 in gross revenues from sandbar and non-sandbar LCS landings under the status quo (Table 4.9). Under the adjusted and base quotas for alternative suite 4, incidental permit holders operating outside the research fishery would still be able to retain 3 non-sandbar LCS per trip until the regional non-sandbar LCS quotas were filled. This trip limit translates into an average trip weight of 101 lb dw (3 non-sandbar LCS x 33.7 lb dw [average commercial weight of non-sandbar LCS] = 101 lb dw). Based on 2006 ex-vessel prices, this translates into $190 in gross revenues per trip (assuming 5 percent fin weight and 95 percent carcass weight). Given there were, on average, 347.3 incidental trips reported in the Coastal Fisheries and HMS logbooks from 2003 to 2005, this would result in gross revenues of $65,987 for incidental permit holders from non-sandbar LCS landings. Therefore, gross revenues for incidental permit holders from non-sandbar LCS landings on either a trip basis or total gross revenues would still be reduced by approximately 38-percent based on the trip limits for the adjusted and base non-sandbar LCS quotas (Table 4.11). This is mainly due to the prohibition of sandbar sharks to fishermen operating outside the research fishery. Since most incidental shark permit holders are in the states of Florida, Louisiana, New Jersey, and North Carolina (Table 3.32), these states would be most negatively impacted by alternative suite 4.

Time/Area Closures

Under alternative suite 4, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February of 2007 (72 FR 5633). Therefore, the economic impacts associated with these closures would be the same as described under alternative suite 1. In addition, NMFS would also implement the South Atlantic Fishery Management Council MPAs as described under alternative suite 2. Therefore, the economic impacts associated with the MPAs would be the same as described in alternative suite 2.

Reporting

This alternative suite could result in neutral economic impacts. Shark dealers would be still be required to submit landings data twice a month, however, they would need to ensure that it is actually *received* by the Agency within 10 days of a bimonthly reporting period ending. Currently, shark dealers simply have to ensure that the landings reports submitted to NMFS are *post-marked* within 10 days of the end of a reporting period. Additional burden is not expected as a result of modifying the regulations to ensure that dealer reports are actually received. Furthermore, timelier reporting and receipt of information by the Agency may result in a decreased likelihood that quotas would be exceeded and overharvests removed from forthcoming shark seasons.

This alternative suite would increase the level of observer coverage for a limited number of vessels that would apply and be selected for participation in a shark research program. One-hundred percent observer coverage would be required for all vessels participating in this program. Vessels outside the shark research program would still be required to take an observer if selected. All vessels would still be required to complete and submit commercial logbooks in the same timeframe.

Under alternative suite 4, NMFS would change how sharks listed as unclassified on shark dealer reports are accounted for under quota monitoring. NMFS would monitor the species composition of sharks landed outside the research fishery through scientific observers and/or dealer reports. The species composition of shark landings by dealer reports and/or scientific observers outside the research fishery would be applied to unclassified sharks and deducted from the appropriate sandbar, LCS, non-sandbar LCS, SCS, and pelagic shark quotas. NMFS believes this is the most accurate way to account for unclassified sharks from the different quotas, and should improve the accuracy of shark dealer reporting. However, through shark dealer identification workshops, NMFS believes the number of unclassified sharks in dealer reports should decrease over time. Properly identifying sharks may result in negative economic impacts in the short-term because it takes more time. However, submission of accurate shark dealer data may result in positive economic impacts in the long-term as it would improve quota monitoring, decrease the likelihood of extensive overharvests and subsequent closures, and improve the results from stock assessments by ensuring data is more accurate and includes species specific information.

Seasons

The same negative economic impacts for the North Atlantic region described in alternative suites 2 and 3 would exist for alternative suite 4. Furthermore, seasons would be closed within five days notice of any species/complex attaining 80 percent of their quota. The primary difference between alternative suite 4 and the other alternatives would be that there would be a limited number of vessels that would be selected to participate in a shark research program, and would be able to land sandbar, non-sandbar LCS, and other species/complex year-round if quota was available. However, since NMFS established a separate non-sandbar LCS quota for the shark research fishery, sandbar, LCS, non-sandbar LCS, SCS, and pelagic shark fisheries would close with five

days notice when each fishery achieves 80 percent of their respective species/complex quota. This should allow each fishery to harvest their respective quota and not result in negative economic impacts.

Regions

Based on public comments, NMFS has analyzed the impact of two regions regarding non-sandbar LCS quotas (see Appendix C). This would afford the Gulf of Mexico region a higher non-sandbar LCS quota, based on historical landings, than the Atlantic. Based on 2006 ex-vessel prices, given base non-sandbar LCS quotas (188.3 mt dw in the Atlantic region and 439.5 mt dw in the Gulf of Mexico region), gross revenues from non-sandbar LCS landings would be $517, 657 in the Atlantic region and $1,433,034 in the Gulf of Mexico region (Table 4.18). Under the adjusted quotas (187.8 mt dw for the Atlantic region and 390.5 mt dw in the Gulf of Mexico region), gross revenues from non-sandbar LCS landings would be slightly lower with $516,285 in the Atlantic region and $1,273,269 in the Gulf of Mexico region (Table 4.18). While this may disadvantage the Atlantic region by establishing a smaller Atlantic regional quota, it would allow for regional accounting of overharvests. Given the large overharvests in 2007, particularly in the Gulf of Mexico region (see Appendix C), establishing two regions allowed NMFS to account for overharvests within each region, therefore not penalizing the Atlantic region for overharvests in the Gulf of Mexico. This would also result in positive economic benefits with regional accounting of overharvests to both regions in the future.

Two regions could still result in negative economic impacts on regions that do not have sharks present year-round. The North Atlantic region would be disadvantaged as a result of two regions versus three under the status quo, because sharks do not normally migrate north until the summer months. Thus, southern states would have a higher likelihood of harvesting the quota before sharks became available in the North Atlantic region. However, the trip limits have been established to ensure that the shark seasons would be open for a longer period of time than under the status quo, thus helping to offset some of the negative impacts of the two region approach. As a result, the shark season should stay open longer than under the status quo, giving the North Atlantic region a greater chance to harvest sharks later in the shark season. This alternative suite would also implement a shark research program that would allow a limited number of vessels to conduct fishing activities in all regions throughout the year. Vessels outside the research fishery could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. The decrease in year-round availability of shark product may have a more negative effect on dealers in the North Atlantic region than vessel owners, since vessel owners have the opportunity to move south to fish.

Recreational Measures

Under alternative suite 4, recreational fishermen would be allowed to land non-ridgeback LCS and tiger sharks. Recreational fishermen would not be able to land sandbar sharks and silky sharks. On average, 4,235 sandbar sharks and 1,943 silky

sharks were landed annually by recreational anglers between 2002 and 2006. Recreational anglers could still catch and release these species. However, Charter/Headboat captains may experience negative economic impacts if customers are not willing to hire charters since they cannot land sandbar or silky sharks. Most Charter/Headboat permits are located in Florida, Massachusetts, New Jersey, and North Carolina (Table 3-33). Therefore, these states may be the most affected by these prohibitions.

Tournaments offering prize categories for large coastal shark may also experience negative economic impacts as a result of prohibiting sandbar and silky sharks. Only 7 percent of tournaments in 2007 awarded points or prizes for ridgeback shark species. The States of New York, Florida, Maryland, Alabama, Puerto Rico, South Carolina, and Texas have registered LCS tournaments, with New York, Florida, Maryland, and Texas having the most tournaments that award points or prizes for LCS (Table 3-39). Therefore, these states may be most affected by recreational anglers not being allowed to land sandbar and silky sharks in tournaments. The economic impacts could include unquantified reductions in participation in the affected tournaments and potential decrease in enjoyment by participants and audiences if these tournaments either eliminate prize categories for the species prohibited by this alternative or switch to a catch-and-release format.

6.4.5 Alternative Suite 5: Close Atlantic Shark Fisheries

Quotas, Species Complexes, and Retention limits

Alternative Suite 5 would have significant economic and social impacts on a variety of small entities, including: commercial shark permit holders, shark dealers, gear manufacturers, bait and ice suppliers, and other secondary industries dependent on the shark fishery. The level of economic impact would be directly proportional to the amount of revenues that each entity has realized from past participation in the shark fishery. Permit holders would be impacted differently depending on the quantity of sharks landed in the past. Vessels targeting sharks (directed permit holders) landed an annual average of 1,263 mt dw of LCS, 223 mt dw SCS, and 173 mt dw pelagic sharks per year between 2003 to 2005 based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. The gross revenues based on 2006 ex-vessel prices of these landings are estimated at $4,702,031, $681,880, and $764,512 for LCS, SCS, and pelagic sharks, respectively, based on price information provided in Table 3.42. While it is unlikely that many directed shark fishermen subsist entirely on revenues from the shark fishery, impacts would still be severe for those participants that depend on any income from shark fishing at certain times of the year. Because of the extensive economic impacts to shark directed permit holders as a result of this alternative suite, it is assumed that directed permit holders would likely pursue one of the following options as a result of closing the Atlantic shark fishery: (1) move fishing effort to other fisheries for which they are already permitted (snapper grouper, king and Spanish mackerel, tilefish, lobster, dolphin/wahoo, *etc*.), (2) acquire the necessary permits to participate in other fisheries (both open access and/or limited access fisheries), or (3) relinquish all permits and leave

the fishing industry. Table 3.32 displays the other permits held by directed shark permit holders as of May 2007.

Incidental permit holders would face negative economic and social impacts as a result of closing the Atlantic shark fishery, however, not as severe as directed permit holders. It is assumed that incidental permit holders receive the majority of their fishing income from other fisheries, depending on the region and the type of gear predominantly fished (*i.e.*, swordfish, tunas, snapper grouper, tilefish, dolphin/wahoo, lobster, *etc*.). NMFS estimates that, on average, between 2003 to 2005 incidental permit holders landed 26.9 mt dw LCS, 17.3 mt dw SCS, and 45.5 mt dw pelagics per year based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. Based on 2006 ex-vessel prices, this equates to gross revenues of $106,491, $52,882, and $201,061 for the LCS, SCS, and pelagic species complexes, respectively. Incidental permit holders would likely have to increase effort in these other fisheries to replace lost revenues from landing sharks. Furthermore, these vessels may seek other permits (open access or limited access transferred from another vessel) or leave the fishing industry entirely.

This alternative suite could also have negative economic and social impacts for shark dealers as they would no longer be authorized to purchase shark products from Federally permitted shark fishermen. Shark dealers also maintain permits to purchase other regionally caught fish products. Due to the brevity of the LCS shark fishing season, which is the shark fishery that accounts for the majority of the shark product revenue due to the fin value, many dealers also get revenue from purchasing fish products other than sharks. The majority of shark dealers hold permits to purchase other fish products, including swordfish, tunas, snapper grouper, tilefish, mackerel, lobster, and dolphin/wahoo among others. It is difficult to estimate, at the individual dealer level, the quantity of revenues received exclusively from shark products.

Shark fin dealers, specializing in the purchase of shark fins from Federal and state permitted dealers, would also experience negative social and economic impacts as a result of closing the shark fishery. These dealers receive virtually all of their income from purchasing shark fins and shipping them to exporters. Exporters then transport the fins to global and domestic markets. This alternative suite would likely force shark fin dealers to leave the industry or focus on purchasing other fishery products, resulting in significant economic impacts to the individuals involved in this trade.

It is difficult to estimate the indirect economic and social impacts that would be experienced by various small entities that support the shark fishery, *e.g.*, purveyors of bait, ice, fishing gear, and fishing gear manufactures. However, these impacts would likely be negative. It is difficult to estimate these impacts as it is uncertain to what extent vessels that were fishing for sharks would redistribute their fishing effort to other fisheries, or simply cease fishing operations. If the majority of vessels affected by a shark fishery closure simply displace effort to other fisheries it is assumed that they would still be dependent on small entities for their bait, ice, and gear as these are products are essential for fishing excursions targeting any species. Redistributing effort to other fisheries would mitigate negative economic impacts. However, if a significant number of

vessels simply cease fishing operations or scale back considerably, then severe economic consequences would be imparted on these support industries as a result.

Time/Area Closures

Seasonal time area closures for BLL gear would no longer be applicable as a result of this alternative. Measures that affect the shark gillnet fishermen during the right whale calving season (November 15 – March 31 every year) are administered by the Atlantic Large Whale Take Reduction Team and these measures would still apply to fishermen who possess a commercial shark permit and fish in the calving area between the months of November through April. These measures are specific to the mesh size of gillnets that are being deployed, therefore, these measures would continue to apply to shark permit holders regardless of which species they are pursuing during these months in this area. Negative economic and social impacts would likely occur as a result of maintaining these closures.

Reporting

This alternative suite would increase the proportion of fishermen completing the Coastal Fisheries Logbook who are selected to report information on fish that are discarded. Currently, 20 percent of the fishermen completing this logbook are selected. This percentage would be increased to facilitate improved data available for shark interactions with longline and gillnet gear. This information would be especially useful because sharks could no longer be landed and the existing Coastal Fisheries logbook only requires fishermen to provide data on landed fish. Increasing the number of fishermen who are selected to provide this data would result in negative economic and social impacts because it would require additional paperwork to be filled out. Increased reporting burden would be subject to authorization under the Paperwork Reduction Act. It is unlikely that fishermen would keep their shark permits under this alternative and there would no longer be required to take an observer. Shark dealers would no longer be required to submit federal dealer reports regarding sharks purchased – dealer reporting may still be required by individual states.

Seasons

Seasons for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

Regions

Regions for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

Recreational Measures

Closing the Atlantic recreational shark fishery would have negative economic and social impacts. These impacts would be most pronounced for Charter/Headboat operators whom specialize in landing sharks and operators of shark tournaments that have

prize categories for landing sharks. It is difficult to estimate the number of Charter/Headboat operators that specialize in shark charters as the permit covers any participant targeting swordfish, sharks, tunas, and billfish. Many Charter/Headboat operators target a variety of species depending on client interests, weather, time of year, and oceanographic conditions. Charter/Headboat operators specializing in shark fishing charters would have to target other HMS or non HMS species to replace revenues lost as a result of customers not being able to land sharks. However, not all customers necessarily want to land sharks. Charter/Headboat operators would still be able to catch sharks, however, all sharks regardless of species would need to be released in a manner that maximizes their chances of survival. Catering business operations to clientele interested in catch and release fishing for sharks might mitigate some of the negative economic impacts.

Shark tournaments that award prizes for landing sharks would be negatively impacted as a result of this alternative suite. There have been 79 tournaments/year that had a prize category for sharks from 2005-2006. The majority of these tournaments target pelagic sharks and are held in the North Atlantic and Gulf of Mexico regions. These tournaments would either modify their rules to only allow points/prizes for released sharks or these tournaments would cease to exist. Economic impacts on small entities such as restaurants, hotels, gear manufacturers, retail stores selling fishing supplies, and marinas in the vicinity of where these tournaments are held would also experience negative economic impacts.

HMS Angling permit holders would also experience negative impacts, despite the fact that they would still be able to catch and release sharks. Landings would not be permitted by any recreational anglers as a result of this alternative suite.

Closing the Atlantic shark fishery would have negative economic impacts on global shark fin markets. As a result of this alternative suite, U.S. flagged vessels would no longer be able to contribute to the global demand for shark fins. This would disadvantage U.S. shark fishermen as global markets would likely need to purchase their shark fins from other markets. However, the U.S. is not a significant producer of shark products globally. Based on data from the United Nations Food and Agriculture Organization (FAO), less than one percent of global shark landings occur in the U.S. Atlantic.

6.4.6 Alternative 6: Stock assessments for Sharks Every 2-3 Years (Status Quo)

Economic impacts of conducting stock assessments every 2-3 years could be neutral. The timing of the stock assessments does not generally have a direct economic impact, however, measures that are necessary to prevent overfishing and/or rebuild overfished stocks generally have a negative economic impact on small entities that depend on landings sharks for their livelihood. If conducting stock assessments more frequently would continue to result in the implementation of measures that require reductions in fishing mortality to maintain consistency with National Standard 1, then negative economic impacts could occur as a result. Alternatively, if results were positive

for certain shark stocks, then assessing shark populations more frequently would have positive economic impacts. As additional data become available, it is difficult to predict the results of forthcoming stock assessments and the economic ramifications of the measures that need to be implemented as a result. However, the Agency has adopted the SEDAR approach to stock assessments which encourages full participation from industry, environmentalists, academics and other parties affected by stock assessments to participate at all workshops.

6.4.7 Alternative 7: Stock assessments for Sharks At Least Every 5 Years - Preferred Alternative

Economic impacts of conducting stock assessment could be variable depending on the results of the stock assessment and management measures necessary. Scheduling stock assessments so that there is more time between assessments allows participants in shark fisheries to adapt to management measures implemented in the past. This provides participants with the opportunity to decide if, and to what degree, they may continue to stay engaged in shark fisheries. More frequent stock assessments would have positive economic impacts if information attained from assessments indicated that quota levels and fishing mortality may be increased for certain species because fishermen would be able to harvest more sharks. Furthermore, participants may experience negative economic impacts if the results change dramatically and additional measures are needed to reduce fishing effort and mortality.

6.4.8 Alternative 8: SAFE Report Published in January or February of Every Year (Status Quo)

There are no negative social or economic impacts associated with NMFS publishing a safe report each year in either January or February as this deadline is mainly administration in nature. By publishing the SAFE report annually according to NS 2, framework actions and FMP amendments could base annual harvest levels from each stock, document significant trends or changes in the resource, the bycatch, and the fishery over time, and assess the relative success of existing state and Federal fishery management program. In doing so, management actions could appropriately address the fishery to minimize negative social and economic impacts to fishermen. However, the timing of the SAFE report within the calendar year would not affect any of these issues, therefore, maintaining the status quo would result in neutral social and economic impacts.

6.4.9 Alternative 9: SAFE Report Published in the Fall of Every Year

There are no negative social or economic impacts associated with publishing the SAFE report in the fall of every year. Publishing the SAFE report in the fall would give the Agency more discretionary time to develop a SAFE report each year according to the guidelines under NS 2. However, since a SAFE report would still be published on an annual basis, it would provide the needed information so management actions could appropriately address the fishery to minimize negative social and economic impacts to fishermen. Therefore, publishing a SAFE report each year in the fall would have neutral social and economic impacts.

Chapter 6 References

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